

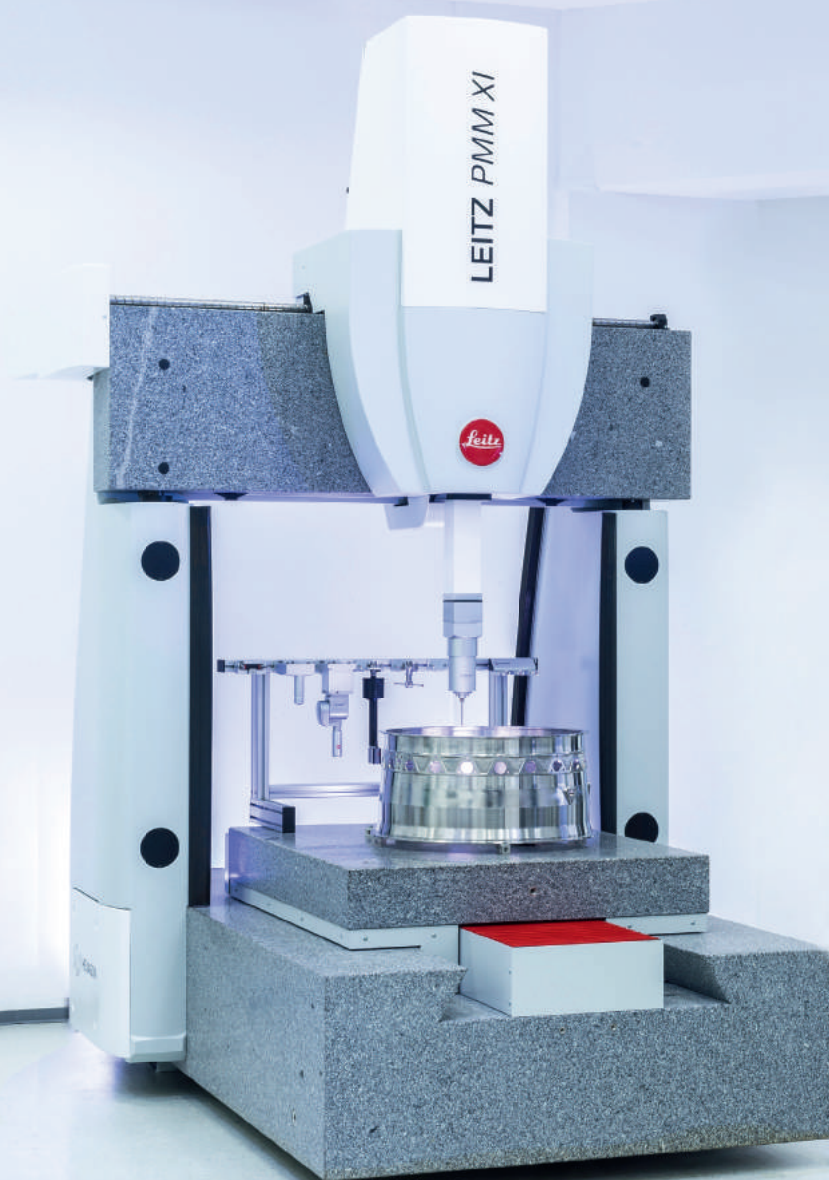


HEXAGON
MANUFACTURING INTELLIGENCE

PRODUCT BROCHURE

LEITZ PMM-C LINE

EFFICIENT ULTRA-HIGH ACCURACY
COORDINATE MEASURING MACHINES



DECISIVELY MORE ACCURATE

Manufacturing companies are under increased pressure to produce products at a higher level of quality whilst reducing costs. This means the manufacturing process must become more efficient, minimising the number of scrap parts and reworks. Leitz PMM-C coordinate measuring machines (CMMs) provide actionable information for development, construction, production and quality assurance.



Automotive

Engine blocks, cylinder heads, valve seating and guides, camshafts, control cams



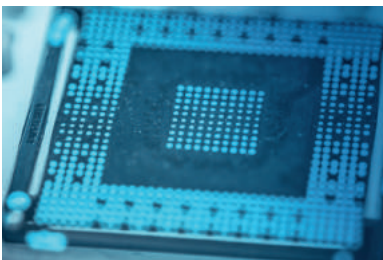
Aerospace

Drive train components, blades and blisks, support structures, housings



Mechanical Engineering

Gearboxes, axles and shafts, bearings



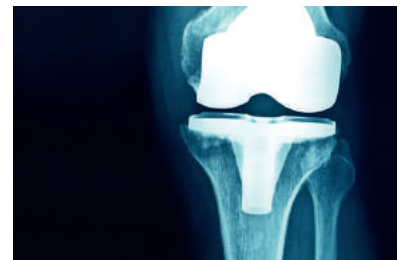
Precision Industry

Optics, electronics, small complex components



Powertrain Technology

Straight and helical gears, bevel gears, worm gears, gear-cutting tools



Medical Technology

Implants, medical instruments, internal and external fixators, prosthetics



INTELLIGENT DESIGN BRINGS GREAT ADVANTAGES

Every detail of the Leitz PMM-C series is focused around achieving certainty with accurate information users can trust. The characteristic feature of the series is the closed-frame design, which is comprised of a solid granite base, a fixed portal with cast iron pedestals and a granite crossbeam.

With excellent scanning performance due to the variable high-speed scanning (VHSS), measurements can be carried out following the principle 'as fast as possible, as slow as necessary'. The scanning speed is adapted to known geometries in real time, with simple lines being scanned fast and the speed automatically changing when scanning complex passages.

The optional use of the rotary table allows scanning procedures to be carried out with continuous 4-axis scanning, so even highly complex parts can be scanned quickly with a high point density.

Full Safety

A safety and collision protection system stops the measuring sequence in the event of a detected collision and a crash is avoided. This minimises repair costs and maximises operating times.

Large Air Bearing Base

The table is guided on a unique dovetail guideway, which is friction- and wear-free. The air bearings are maintenance-free.

Moving Table

The travelling measuring table on pre-loaded air bearings with centrally-positioned spindle drive ensures constant dimensional relationships and efficient movement sequences with no tilting or twisting.

Best Reproducibility

High-resolution scales for the highest reproducibility of measurement results.

Highest Positioning Accuracy

Servo-drives with recirculating ball screws accelerate rapidly while retaining positional accuracy, reaching top speeds even over short movement paths.

Closed-Frame Design

The granite base with fixed portal of cast iron with a granite crossbeam ensures long-term stability. The high stiffness of the measurement axes is designed to ensure consistent accuracy over the entire measurement volume.

Temperature Stability

Errors of measurement due to changes in temperature or faulty operation are minimised using precision steel scale bars with the same expansion coefficients as most measured parts.

Temperature Compensation

Due to integrated temperature sensors, an automatic compensation for temperature-conditional residual errors of the scale bars is carried out.

Future Ready

The Hexagon Manufacturing Intelligence cabling concept allows the integration of further tactile and optical sensors at any time with the SENMATION intelligent sensor automation system.

Decoupled X and Y Axes

Deviations in the guidance of one axis have no effect on the other axes, ensuring quick correction and restart.



AN ACCURATE FOURSOME

Four ultra-high accuracy models make up the Leitz PMM-C series, catering for a wide range of requirements from cost efficiency to sub-micron accuracy. There is a Leitz PMM-C CMM for almost every application.

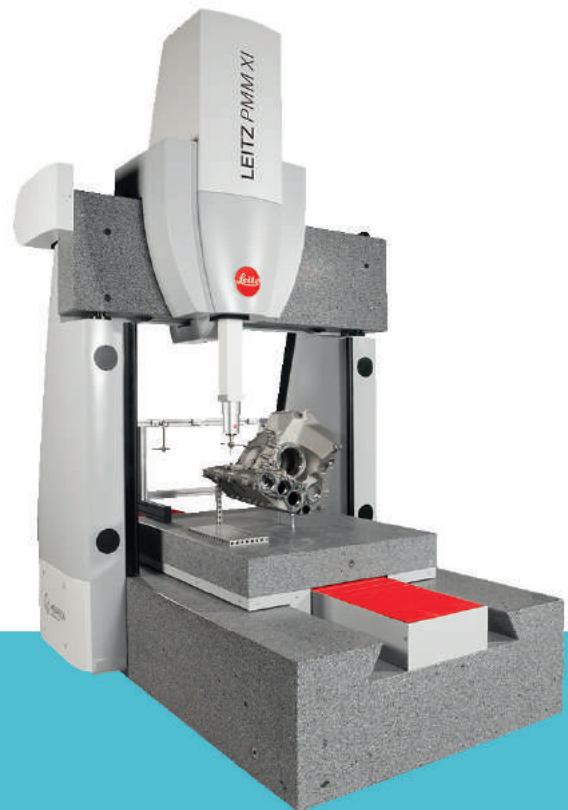


Leitz PMM-C

The original model of the series is the accurate and highly-dynamic Leitz PMM-C. This CMM can be equipped with variable high-speed scanning sensors and optical sensors, and is available in a wide variety of measurement ranges.

Accuracy [μm]:
 $0.5 + L / 700$

Probing frequency:
40 points/min



Leitz PMM-Xi

The Leitz PMM-Xi is the cost-efficient model of the series. Accurate and dynamic, it is available in many measurement ranges and therefore especially suitable for small and medium-sized enterprises.

Accuracy [μm]:
 $0.5 + L / 500$

Probing frequency:
25 points/min



Leitz Ultra

High accuracy and efficient variable high-speed scanning sensors distinguish the Leitz Ultra. Equipped with active pneumatic damping, influences from vibrations are eliminated.

Accuracy [μm]:
 $0.4 + L / 850$

Probing frequency:
20 points/min



Leitz Infinity

Leading the way for ultra-high accuracy 3D metrology is the Leitz Infinity CMM. It is compatible with a wide range of tactile and optical sensors and is equipped with active pneumatic damping. With a basic accuracy of 0.3 microns, the Leitz Infinity is perfect for use in calibration laboratories.

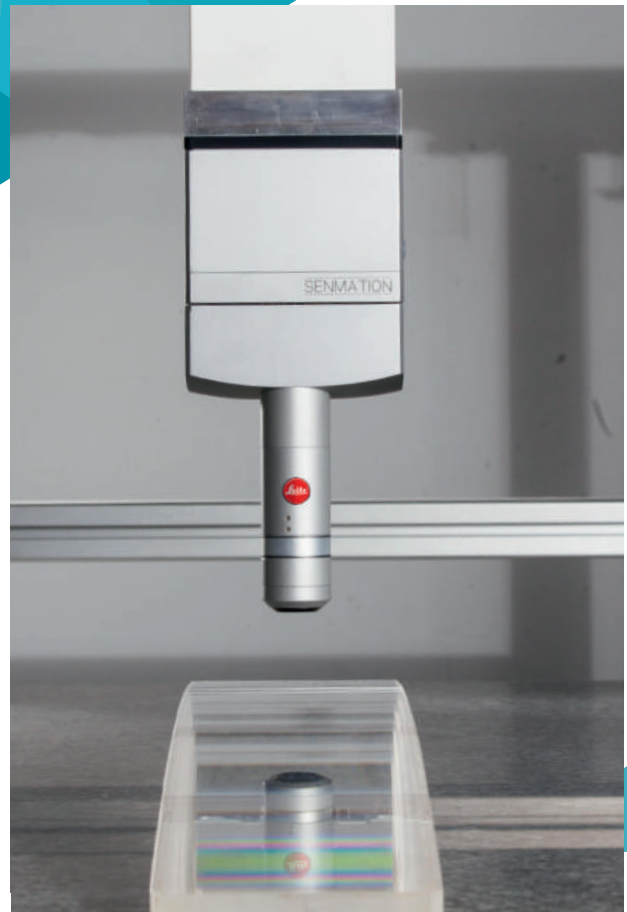
Accuracy [μm]:
 $0.3 + L / 1000$

Probing frequency:
20 points/min



EFFICIENT ENGINE BLOCK MEASUREMENT

Engine block measurement requires a high-precision measuring system, which is why a Hexagon Manufacturing Intelligence Leitz PMM-Xi with the HP-S-X5 HD fixed sensor system is commonly used for this task. If the measurement processes are to be accelerated, an indexing head can be used to save valuable measuring time. The SENIMATION sensor interface offers the option of viewing the measuring task from a variety of different perspectives.



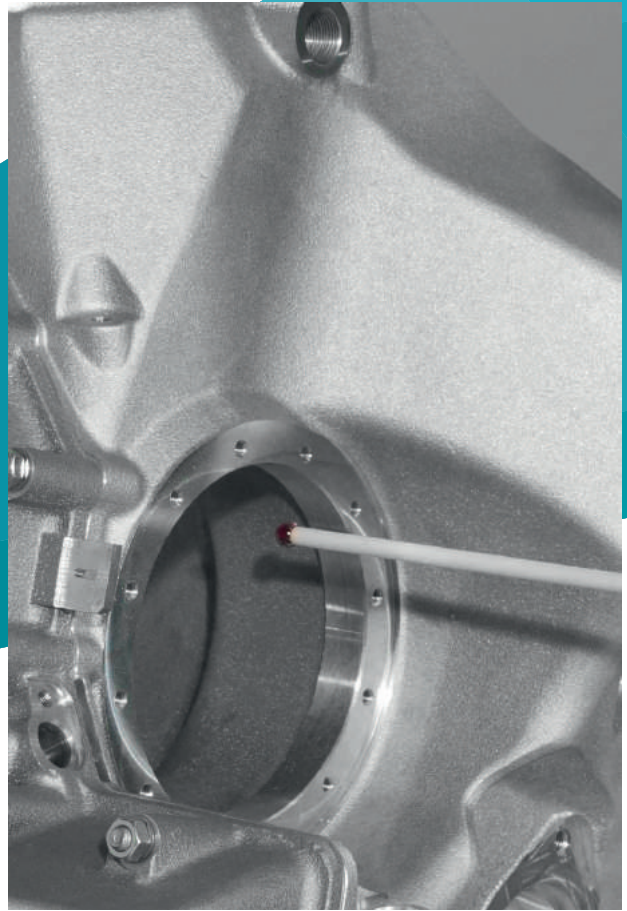
CONTACTLESS MEASUREMENT OF LARGE LENSES

Lenses are precision components, where the smallest deviation from the target geometry results in a change in quality. Quality control can only accompany production if a high-accuracy measuring centre such as the Leitz PMM-Xi from Hexagon is used, particularly with large lenses with a diameter greater than 200 mm. The combination of tactile measurement with the HP-S-X5 HD for alignment and the PRECITEC LR optical sensor for quality assessment of the lens geometry, is made possible by the SENIMATION sensor interface in automated measurement procedures.



SUB-MICROMETRE ACCURACY FOR MASTER AND GAUGE CALIBRATION

Gauges and master parts must be calibrated on a regular basis in order to be used efficiently. The continuing return to national standards is a guarantee for reliable, standard compliant and reproducible measurement results within every manufacturing company. The high-accuracy Leitz Infinity and Leitz Ultra CMMs provide the ideal bases for these highly-complex measuring tasks.



PRECISION MEASUREMENT FOR POWERTRAIN COMPONENTS

Components of the powertrain – the drive section – are subject to very stringent production requirements. The tolerances are tight and only allow deviations in the micron range. This is required for optimum use of these high-performance components. The precision with which engine blocks and shafts are made, for example, is applied again to an even greater degree in quality assurance. The CMMs of the Leitz PMM-C line from Hexagon enable measurement with the required high level of accuracy.

TACTILE AND OPTICAL MEASUREMENTS

Tactile probe heads from Hexagon Manufacturing Intelligence have always been known for their dynamics and accuracy, supporting single-point probing, self-centring 3D scanning and variable high-speed scanning.

The deflection is captured in high resolution. During the measurement process, the axes of the probe head are not clamped, so that the actual direction of the surface normal can be determined and used as the basis for the measurement. Hexagon probe heads have no maintenance-intensive parts or active force generators.



1 LSP-S2/LSP-S2 Scan+

The LSP-S2 probe head stand for maximum measurement performance. Combining maximum accuracy with outstanding high-speed scanning properties, even when using styli extensions up to 800 mm. The measurement of complex geometries with the tightest tolerances becomes a standard measurement task with this fixed probe head.

2 LSP-S4

The LSP-S4 probe head enables the usage of horizontal styli extensions of 660 mm for the measurement of elements deep inside a workpiece. Due to its integrated automatic balancing system, styli configuration with a maximum weight of 1000 g can be carried.

3 HP-S-X5 HD

The HP-S-X5 HD fixed probe head offers single-point measurement for all standard inspection tasks and variable high-speed scanning for the form and profile measurement of complex geometries such as spur gears, worm gears, turbine blades and worm wheels. With a maximum sensor extension of 800 mm, even elements at a great immersion depth can be measured.

4 HP-S-X1H with HH-A-T2.5/T5

Using the HP-S-X1 probe head, fast and precise measurement processes are guaranteed for all probing procedures, from single-point probing to self-centring scanning to variable high-speed scanning. The HP-S-X1H is combined with the HHA-T2.5 or T5 indexing head and makes it easy to access highly-complex workpieces. The sensor can also be flexibly used with a maximum styli extension of 225 mm.

5 PROFILER R

The PROFILER R enables roughness measurements to be made with the CMM. The sensor is adapted to the HP-S-X5 HD or LSP-S2/LSP-S2 Scan+ and automatically integrated into the measurement process using a styli changer rack. Roughness is measured through tactile surface scanning, and the measurement values are transferred to the measuring system via Bluetooth.

6 PRECITEC LR

The PRECITEC LR optical sensor offers excellent measurement accuracy for demanding surfaces, including transparent, reflective, matte or coated materials. This makes the sensor a versatile measurement solution. Based upon a large acceptance angle, even steep surfaces can be measured. Only available on selected models in the Leitz PMM-C series.

7 HP-O

The HP-O optical sensor captures measuring points on a wide variety of different materials quickly and efficiently. Even shiny and reflective surfaces can be measured reliably with maximum accuracy. The HP-O is used for both single-point probing and continuous scanning tasks.

8 HP-O/HP-S-X1 with HH-AS8-OT2.5

The HH-AS8-OT2.5 indexing head utilises the fast and precise measurement processes of the HP-S-X1 sensor systems, with the added benefit of optical measurement capability with the HP-O sensor. The flexibility of this 2.5° indexing head allows users to measure complex applications such as blisks, blades, small radii and chamfers with ease. Switching between sensors is simple and efficient with the use of HR-R tool rack system. The HH-AS8-OT2.5 is compatible with Leitz PMM-Xi CMMs upgraded with the SENMATION intelligent sensor automation system.

Advantages

- Automatic sensor detection
- Fully automatic changing of sensors within the measurement program
- Calibration need not be carried out again after sensor change
- Enables maximum flexibility and full CMM capacity utilisation





SENMATION

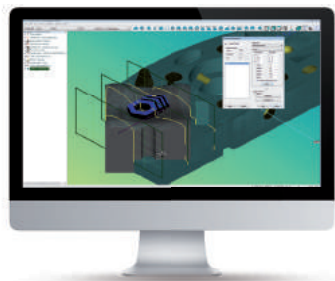
SENMATION – INTELLIGENT SENSOR AUTOMATION

To allow even the most complex measurement tasks involving different sensors to be carried out on a coordinate measurement machine, Hexagon Manufacturing Intelligence developed the SENMATION intelligent sensor automation system. Using a universal interface, a wide variety of different sensors are changed fully automatically, guaranteeing a high degree of flexibility.

THE FUTURE-READY CONCEPT

The Future-Ready Concept optimises the CMM for the SENMATION intelligent sensor automation system upgrade. The universal pre-cabling enables a simple integration process at any time, allowing for flexible application changes without costly downtime.

COMPREHENSIVE SOFTWARE – DEVELOPED TO PROVIDE THE BEST SUPPORT



PC-DMIS

PC-DMIS has powerful capabilities to enable users to measure everything from simple prismatic parts to the most complex aerospace and automotive components. PC-DMIS CAD++ is available with optional modules to fine-tune the software for specific applications.



QUINDOS

QUINDOS is the specialist, expandable software that sets the standard for special geometry metrology. Developed to work in partnership with Hexagon Manufacturing Intelligence ultra-high accuracy measuring machines, nearly every measurement task can be solved for a wide variety of different components. QUINDOS can be freely configured for any measurement requirement and expanded later if required using any combination of over 50 available options. All performance and evaluation of measurements are carried out in accordance with the respective national and international standards.



QUINDOS Gears

The QUINDOS option for gear measurement has the ability to measure gear wheels, bevel gears and gear-cutting tools even without a rotary table. The applicable tolerance standards are included in the options. QUINDOS Gears also supports the pallet measurement option for gearing to ensure high throughput.





HEXAGON

MANUFACTURING INTELLIGENCE

Hexagon Manufacturing Intelligence helps industrial manufacturers develop the disruptive technologies of today and the life-changing products of tomorrow. As a leading metrology and manufacturing solution specialist, our expertise in sensing, thinking and acting – the collection, analysis and active use of measurement data – gives our customers the confidence to increase production speed and accelerate productivity while enhancing product quality.

Through a network of local service centres, production facilities and commercial operations across five continents, we are shaping smart change in manufacturing to build a world where quality drives productivity.

Hexagon Manufacturing Intelligence is part of Hexagon (Nasdaq Stockholm: HEXA B; hexagon.com), a leading global provider of information technologies that drive quality and productivity across geospatial and industrial enterprise applications.



COORDINATE MEASURING MACHINES



3D LASER SCANNING



SENSORS



PORTABLE MEASURING ARMS



SERVICES



LASER TRACKERS & STATIONS



MULTISENSOR & OPTICAL SYSTEMS



WHITE LIGHT SCANNERS



METROLOGY SOFTWARE SOLUTIONS



CAD / CAM



STATISTICAL PROCESS CONTROL



AUTOMATED APPLICATIONS



MICROMETERS, CALIPERS AND GAUGES



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